APPENDIX G
ESSENTIAL FISH HABITAT ASSESSMENT

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INTRODUCTION

In support of a permit application to the U.S. Army Corps of Engineers, Los Angeles District, and consistent with the requirements of Section 305(b) (2) of the Magnuson-Stevens Fishery Conservation and Management Act, Padre Associates, Inc. has prepared the following assessment of potential impacts to Essential Fish Habitat (EFH) to address Pacific Gas and Electric Company's (PG&E) proposed installation of temporary and long-term ocean bottom seismometers (OBS) and their corresponding power and data cable (Project) in ocean waters near Montaña del Oro State Park and Diablo Canyon Power Plant (DCPP). This assessment is prepared in accordance with 50 CFR 600.920(g)(2) and addresses the managed fish and invertebrate taxa that could occur at the site.

EFH is defined as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters", as used in this definition, are defined to include "aquatic areas and their associated physical, chemical, and biological properties that are used by fish." These may include "…areas historically used by fish where appropriate; 'substrate' to include sediment, hard bottom, structures underlying the waters, and associated biological communities." "Necessary" means, "the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem." EFH is described as a subset of all habitats occupied by a species (NOAA, 1998).

PROPOSED ACTION

The offshore portion of the Project is located on the seafloor located offshore of Montaña del Oro State Park and DCPP in water depths ranging from approximately 0 to 110 m (360 ft). For this assessment, the region is defined as the seafloor and marine waters within these depth ranges between Point Buchon and waters directly southwest of DCPP.

The project will include the onshore and marine activities below:

- Two temporary OBS units at a time will be placed on the seafloor for approximately two weeks. Each temporary OBS unit would record ambient sound and seafloor movement to allow assessment of background conditions. Temp 1 and Temp 2 (Figure 1) will be placed on the seafloor for two weeks, following recovery and data retrieval, the two temporary units will be moved to locations Temp 3 and Temp 4 for two additional weeks of data collection at those sites.

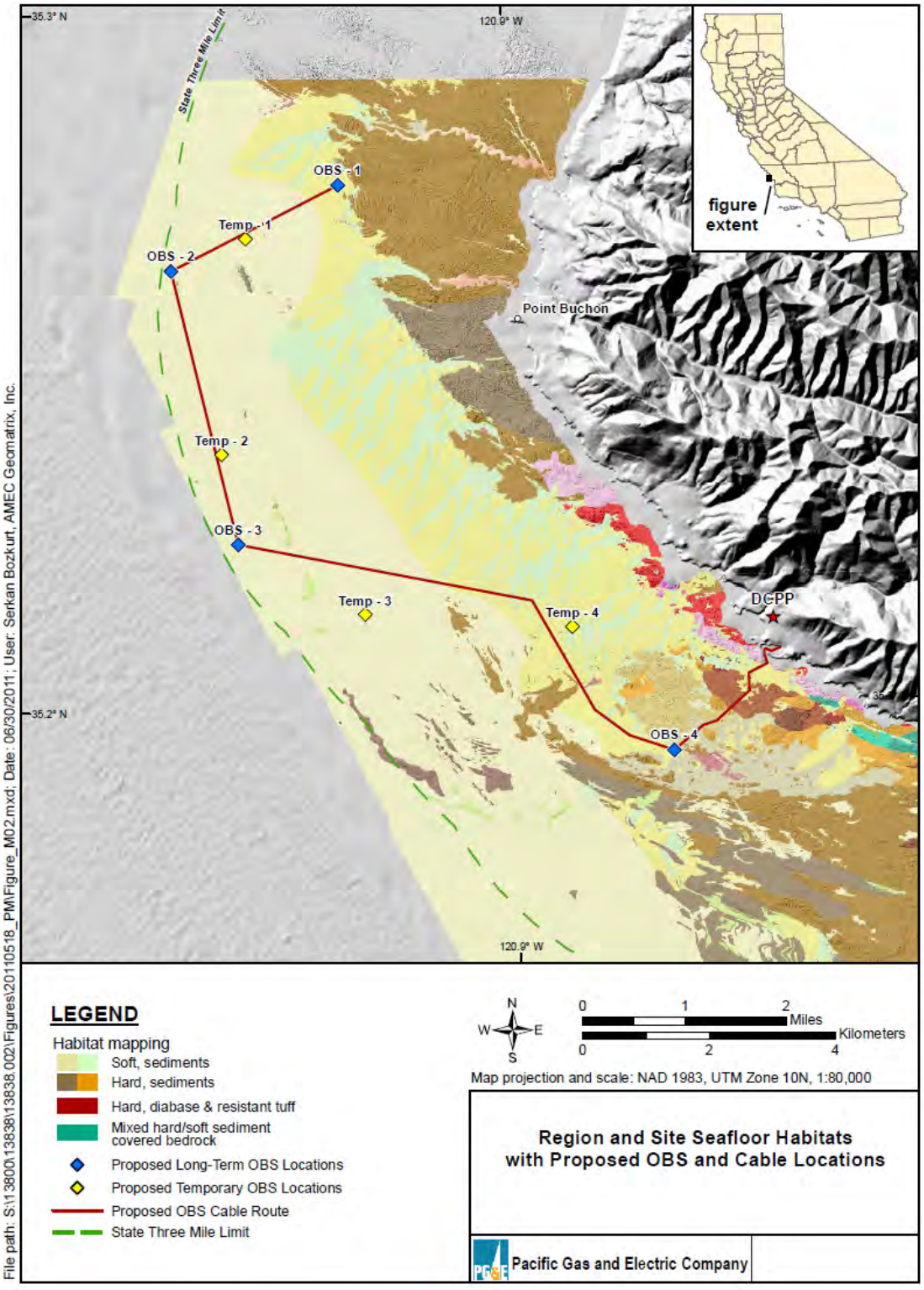

Figure 1. Site Specific Project Area Including Temporary and Long-Term OBS Locations

- There will be four long-term OBS units (Figure 1) that will be connected via cable to an onshore data recorder and power source. Each long-term OBS unit would arrive encased in and attached to the protective concrete dome, which would have three or four "lifting eyes" that will be used to hoist the units using an onboard crane, placing the units on the seafloor. Each unit will be placed on the seafloor individually, with its corresponding "free end" of the cable attached to a floating buoy. As each unit is placed on the seafloor, the previous unit's cable will be attached to the preceding unit, until all units are in place. As currently proposed, the long-term OBS units would be installed in November 2011 and would be *in situ* for up to 10 years
- A data/power cable will connect each of the four long-term OBS units to a shore-based power supply and data recording center located onshore within an existing facilities at the DCPP. Installation of the intertidal portion of the cable would require an extension of an existing PVC conduit located on the rip-rap armor rock within the intertidal area of the DCPP intake embayment. It is anticipated that the cable would be approximately 5 cm (2 in) in diameter and wrapped in an armored polyethylene casing to minimize the potential for wear during its time on the seafloor. The cable would be approximately 18.4 km (11.0 mi) long. The cable will not be buried during installation but is expected to naturally bury itself into the sedimentary seafloor relatively soon after deployment.
- Onshore activities include extending an existing 10 cm (4 in) diameter conduit from its current location on top of the armor rock rip-rap along the east side of the DCPP intake embayment into the water where it would terminate on the sedimentary seafloor. The conduit would house the cable from subtidal area to the data recording equipment and power source located within the existing DCPP facilities.

SEAFLOOR HABITATS AND BIOTA

Point Buchon is the prominent feature of this shoreline that consists of wave-exposed headlands alternating with semi-protected coves. Stable bedrock and variously sized boulders are the predominant substratum. Sand, as fine gravel and shell-debris, is uncommon in the intertidal areas, where it tends to be ephemeral, but becomes the predominant substrate with increasing distance and depth offshore. The nearshore intertidal and subtidal algae, invertebrates, and fishes in the area lying generally between Point Buchon to the north of DCPP and Point San Luis to the south of DCPP have been well studied and are similar to the marine biological communities found in other areas of central California.

Intertidal and Nearshore (to -30 m [-100 ft])

The shoreline of the region is characterized by a rocky headland approximately 19 km (12 mi) in lateral extent, which tends northwest to southeast and which is bounded to the north and south by extensive sand beaches. Diablo Cove to the north of DCPP intake embayment contains giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis luetkeana*), both of which are included in NOAA designated Habitat Area of Particular Concern (HAPC).

A remotely operated vehicle (ROV) survey completed for a fiber optic cable project in similar water depths approximately 10 km (6 mi) to the north provides relevant regional data on the biota within the depth range and seafloor habitat types at the Project site (AMS, 2008). AMS (2008) reports that rocky habitat-associated epifauna found within these water depths include red and purple urchins (*Strongylocentrotus franciscanus* and *S. purpuratus*, respectively), brown turban snails (*Chlorostoma brunnea*), Monterey turban snails (*C. montereyi*), top snails (*Pomaulax gibberosa* and *P. undosa*), red abalone (*Haliotis rufescens*), giant gumboot chitons (*Cryptochiton stelleri*), and many smaller species of invertebrates. Invertebrate predators included the sunflower seastar (*Pycnopodia helianthoides*), the giant seastar (*Pisaster giganteus*), short-spined seastars (*Pisaster brevispinus*), rock crab (*Cancer antennarius*), Kellet's whelk (*Kelletia kelletii*), octopus (*Octopus* spp.), and a variety of smaller predatory seastars, gastropods, and crustaceans.

The common deposit feeders, scavengers, and filter feeders include bat stars (*A. miniata*), anemones (*Anthopleura xanthogrammica*, *A. sola,* and *Epiactis prolifera*), cup corals (*Balanophyllia elegans*), sponges (*Tethya californica* and other encrusting forms), tunicates (*Styela montereyensis* and the encrusting colonial/social tunicates), tube snails (*Serpulorbis squamigerus*), and brittle stars (*Ophiothrix spiculata*). Invertebrate grazers include the nudibranchs *Phidiana hiltoni* and *Doriopsilla albopunctata*.

Deeper Water Areas (to -122 m [-400 ft])

Offshore, low to high relief rock reefs have been recorded to water depths of at least 110 m (360 ft) at and seaward of the State Three Mile Limit, but are more common in water depths shallower than 61 m (200 ft).

In water depths up to 122 m (400 ft), AMS (2008) reports that characteristic sediment-associated biota of the region included sea pens (*Stylatula* sp. and *S. elongata*, *Ptilosarcus gurneyi, Acanthoptilum* sp., and two species of *Virgularia*); brittle stars (unidentified Ophiuroids and *Ophinoneris* sp.); sea stars (*Petalaster [Luidia] foliolata*, *Rathbunaster californica*, and, in the inshore portions, *P. brevispinus*). Cerianthid and other anemones (*Pachycerianthus* sp., *Urticina piscivorus*, *Urticina* sp., and *Stomphia coccinea*, respectively), cancer crabs, including the slender crab (*C. gracilis*) and octopus (*Octopus rubescens*), were common to abundant within the sedimentary habitat in this water depth range. Sediment-associated fish species within this depth range include tonguefish (*Symphurus atricauda*); flatfishes including sanddabs (*Citharichthys* spp.), California halibut (*Paralichthys californicus*), Dover sole (*Microstomas pacificus*), and English sole (*Plueronectes [Parophrys] vetulus*); eelpouts (*Lycodes* sp.); poachers (Agonidae); cuskeels; pink surfperch (*Zalembius rosaceus*); hagfish (*Eptatretus stouti*); and, adult and juvenile rockfish (*Sebastes* spp).

AMS (2008) reported that the rocky habitat within this depth range supported a community of epibiota characterized by gorgonian corals (*Adelogorgia phyllostera* and *Lophogorgia chilensis*), the purple coral, *Stylaster californicus (=Allopora californica),* and white-plumed anemones (*Metridium farcimen=senile*). Rocky substrate-associated fish species common within this depth range include adult and juvenile rockfishes (*Sebastes* spp.), lingcod (*Ophiodon elongatus*), Cabezon (*Scorpaenichthys marmoratus*), and painted greenling (*Oxylibius pictus*).

Nearshore Cable Route

A project-specific diver-biologist survey of the nearshore portion of the cable route was conducted by Tenera (2011). The survey includes both inter- and subtidal observations within that portion of the cable alignment that was within the DCPP intake embayment. Tenera (2011) indicates that the inter- and shallow subtidal habitat (to the -1.5 m [-5.0 ft]) isobath) consists of a mixture of armor rock rip-rap, concrete, and native rock. Dominant biota in this zone include limpets, barnacles, the sea lettuce alga (Ulva spp), bat stars (Asterina miniata), and various brown and red algal species. The seafloor habitat along the deeper subtidal segments of the nearshore portion of the proposed cable route is predominantly sedimentary, although isolated boulders and low-relief rock reefs are present. The proposed cable route does cross a boulder field and some pebble and shell hash was found near the offshore end of the survey area.

Characteristic biota observed within the boulder field included bat stars and sea cucumbers (Parastichopus parvimensis), the ornate tube worm (Diopatra ornata), moon snails (Euspira lewisii), and a tube anemone (Pachycerianthus fimbriatus). Figure 2 depicts nearshore seafloor features and the locations of kelp beds within Zone 2, Zone 3, and Zone 5. Hard-structures such as boulders can be designated rocky reef habitat, a HAPC.

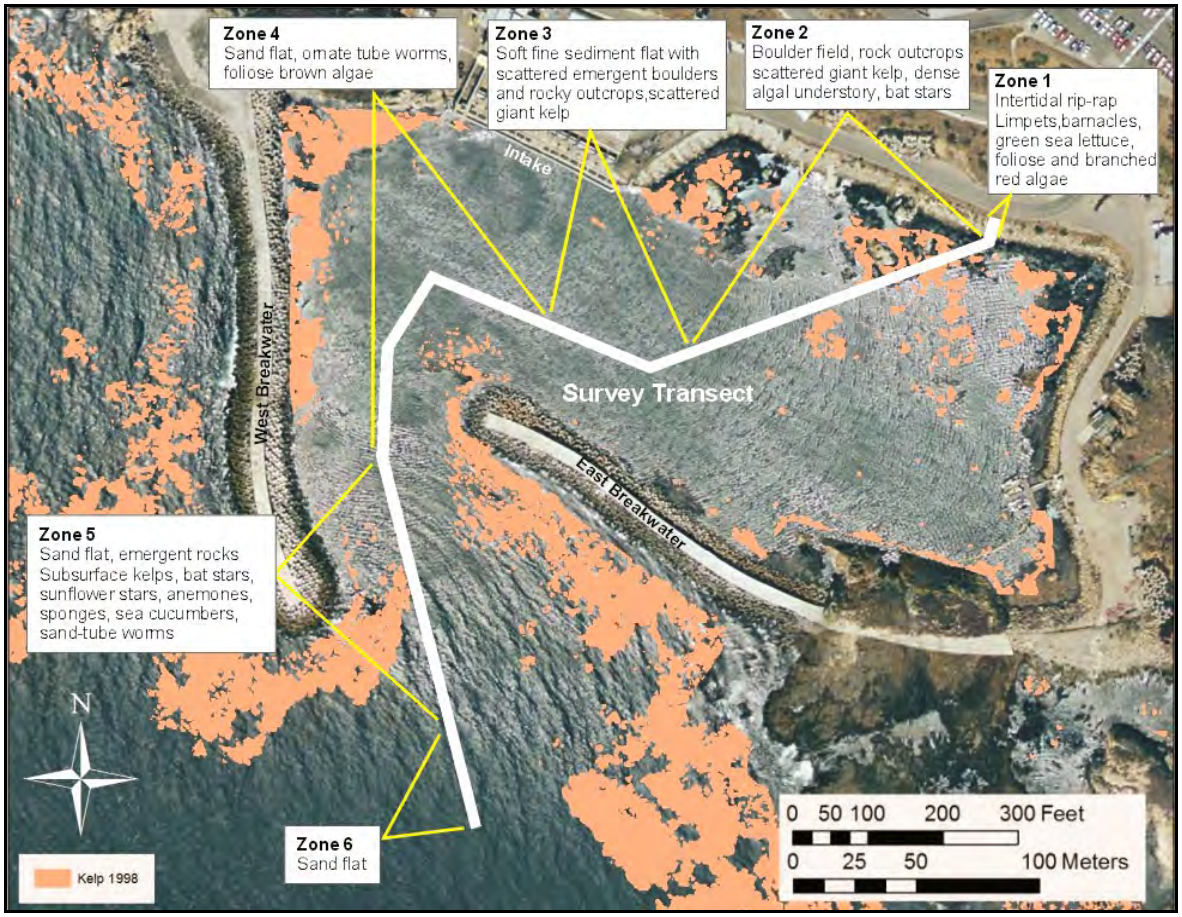

Figure 2. Intertidal and Seafloor Habitats within Nearshore Cable Route

Offshore Cable Route and OBS Locations

Greene (2011) provided a characterization of the deeper water seafloor habitats, including that found at each of the proposed OBS locations, based on the interpretation of previously collected multibeam side sonar data within the project area. Greene estimates that the majority of 17.5 km (10.9 mi) cable route from the 22 m (72 ft) isobath to the OBS 1 location is sedimentary; however, isolated boulders and rock features are present in several areas. A relatively continuous low-relief rock reef habitat is present along an approximate 1 km (0.6 mi) segment in water depths of 25 to 27 m (82 to 89 ft). The seafloor at all of the temporary and long-term OBS sites is sedimentary, although sand/gravel substrate is present at the Temporary OBS 4 location. No rock features were found within 15 m (50 ft) of any of the proposed OBS locations (Greene, 2011).

A Project-specific ROV survey of the potential rocky habitat areas along the cable route was completed in June 2011. Figure 3 shows the survey area and the navigational "fix points" (point where the location of the ROV was recorded) along the survey route. Of the almost 5 km (3 mi) of surveyed area, rocky substrate was observed within approximately 0.5 km (0.3 mi) of the cable route; surveyed areas included water depths from 23 to 69 m (70 to 210 ft).

Interpretation of multibeam side scan sonar data (Greene, 2011) provided information on the possible rocky substrate locations which were pre-plotted into the navigation computer prior to initiating the survey. Sedimentary seafloor along the proposed cable alignment was also surveyed and epibiota and fish observed were recorded.

The results of that survey indicate that low to moderate-relief rock reefs (up to 1 m [3 ft]) high are present in three relatively distinct areas: between Locations 3 and 4 (water depths of 26 to 27 m [80 to 84 ft]); 8 and 10 (35 to 37 m [107 to 112 ft]); and at Location 21 (69 m [210 ft]).

Epibiota associated with the sedimentary habitats, which ranged from coarse-grain sand and gravel in areas of sand waves to fine clayey silts in deeper water areas, included seastars (*A. miniata*, *Mediaster* sp., *Pycnopodia helianthoides*, and *Solaster* sp) and sea pens (*Stylatula elongata, Acanthoptilum* sp and *Ptilosarcus* sp.). Tube worms (cf *Diopatra* spp), burrowing anemones, and unidentified ophiuroids were common to locally abundant within the sedimentary habitats. Sanddabs (*Citharichthys* spp), hagfish (*Eptatretus stouti*), and pink perch (*Zalembius rosaceus*) were present on the sediment; fish were not common throughout the survey areas.

Rocky feature macroepibiota varied with water depth; shallow water (to 40m [120 ft]) included unidentified leafy red algae (on the upper surfaces of higher features only), unidentified solitary corals (probably *Coenocyathus* and *Paracyathus*), seastars (*A. miniata* and *Pisaster* spp), the powder puff anemone (*M. farcimen=senile*), and encrusting sponges. Deeper water rocky features supported some gorgonian corals (cf *Lophogorgia* sp) and the feather star (cf *Florometra* sp). Fish were not common, however subadult rock fish (*Sebastes* spp) and lingcod (*Ophiodon elongatus*) were observed at and around the larger rock features.

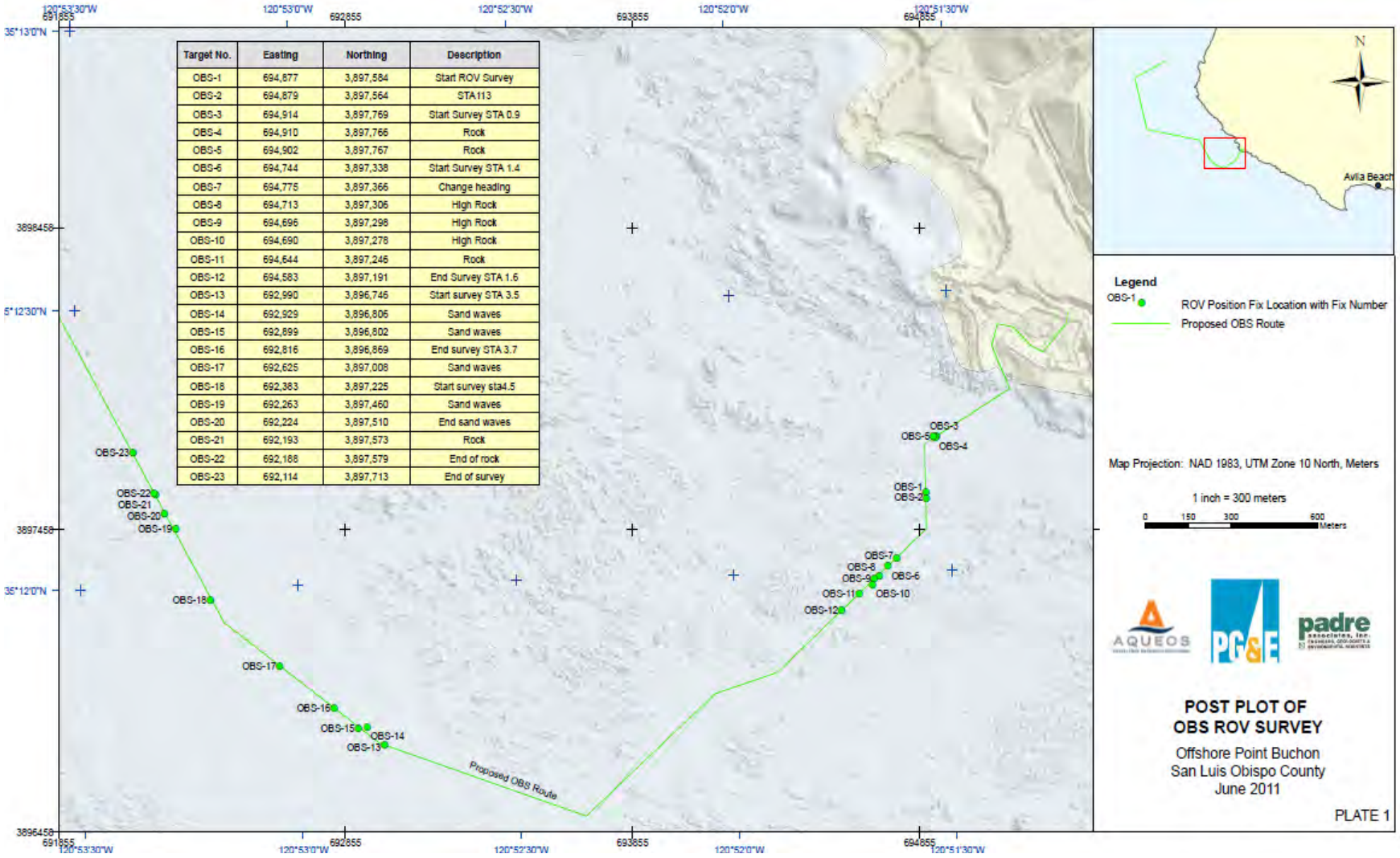

Figure 3. ROV Survey Area and Navigation Fix Locations

Managed Species of Interest

Distribution and habitat information available in Miller and Lea (1972) and Leet, et al. (2001) was used to examine which of the managed species could occur in the vicinity of the project site. Species not occurring in central California are not included in Table 1 below. A total of 95 taxa, including five from the Coastal Pelagics Fishery Management Plan (FMP) (PFMC, 1998), three from the Pacific Salmon FMP (PFMC, 2003a), 78 from the Pacific Groundfish FMP (PFMC, 2003b), and nine from the Highly Migratory FMP (PFMC, 2007) could potentially occur within the Project vicinity.

Table 1. List of Managed Taxa Potentially Occurring Within the Project Area

Common Name	Scientific Name	Common Name	*Scientific Name*
COASTAL PELAGICS			
Northern anchovy[1]	*Engraulis mordax*	Pacific sardine[1]	*Sardinops sagax*
Pacific mackerel[1]	*Scomber japonicus*	Jack mackerel[1]	*Trachurus symmetricus*
Market squid[1]	*Loligo opalescens*		
PACIFIC SALMON			
Chinook salmon	*Oncorhynchus tshawytscha*	Coho salmon	*Oncorhynchus kisutch*
Pink salmon	*Oncorhynchus gorbuscha*		
PACIFIC GROUNDFISH			
Butter sole[1]	*Isopsetta isolepis*	Flathead sole	*Hippoglossoides elassodon*
Curlfin sole[1]	*Pleuronichthys decurrens*	Dover sole[1]	*Microstomus pacificus*
English sole[1]	*Parophrys vetulus*	Petrale sole	*Eopsetta jordani*
Rex sole	*Glyptocephalus zachirus*	Rock sole[1]	*Lepidopsetta bilineata*
Pacific sanddab[1]	*Citharichthys sordidus*	Sand sole[1]	*Psettichthys melanostictus*
Arrowtooth flounder	*Atheresthes stomias*	Ratfish[1]	*Hydrolagus colliei*
Finescale codling	*Antimora microlepis*	Pacific rattail	*Coryphaenoids acrolepis*
Starry flounder[1]	*Platichthys stellatus*	Soupfin shark[1]	*Galeorhinus zyopterus*
Leopard shark[1]	*Triakis semifasciata*	Big skate[1]	*Raja binoculata*
Spiny dogfish	*Squalus acanthias*	Pacific ocean perch	*Sebastes alutus*
Longnose skate	*Raja rhina*	Aurora rockfish	*Sebastes aurora*
Shortbelly rockfish[1]	*Sebastes jordani*	Widow rockfish[1]	*Sebastes entomelas*
Bank rockfish	*Sebastes rufus*	Calico rockfish[1]	*Sebastes dallii*
Black rockfish[1]	*Sebastes melanops*	Black-and-yellow rockfish[1]	*Sebastes chrysomelas*
Blue rockfish[1]	*Sebastes mystinus*	Bocaccio[1]	*Sebastes paucispinis*
Blackgill rockfish	*Sebastes melanostomus*	Bronzespotted rockfish	*Sebastes gilli*
Brown rockfish[1]	*Sebastes auriculatus*	Canary rockfish[1]	*Sebastes pinniger*
Copper rockfish[1]	*Sebastes caurinus*	Gopher rockfish[1]	*Sebastes carnatus*
Grass rockfish[1]	*Sebastes rastrelliger*	Kelp rockfish[1]	*Sebastes atrovirens*
Olive rockfish[1]	*Sebastes serranoides*	Treefish[1]	*Sebastes serriceps*
Yellowtail rockfish	*Sebastes flavidus*	California scorpionfish	*Scorpaena gutatta*

Table 1. (Continued)

Common Name	Scientific Name	Common Name	*Scientific Name*
Cabezon[1]	*Scorpaenicthys marmoratus*	Splitnose rockfish	*Sebastes diploproa*
Chilipepper[1]	*Sebastes goodei*	China rockfish[1]	*Sebastes nebulosus*
Cowcod	*Sebastes levis*	Darkblotched rockfish	*Sebastes crameri*
Flag rockfish	*Sebastes rubrivinctus*	Greenblotched rockfish	*Sebastes rosenblatti*
Greenspotted rockfish	*Sebastes chlorostictus*	Greenstriped rockfish[1]	*Sebastes elongatus*
Honeycomb rockfish	*Sebastes umbrosus*	Pink rockfish	*Sebastes eos*
Rosy rockfish	*Sebastes rosaceus*	Speckled rockfish	*Sebastes ovalis*
Squarespot rockfish[1]	*Sebastes hopkinsi*	Starry rockfish[1]	*Sebastes constellatus*
Stripetail rockfish[1]	*Sebastes saxicola*	Vermilion rockfish[1]	*Sebastes miniatus*
Yelloweye rockfish	*Sebastes ruberrimus*	Yellowtail rockfish[1]	*Sebastes flavidus*
Shortspine thornyhead	*Sebastolobus alascanus*	Pacific cod	*Gadus macrocephalus*
Lingcod[1]	*Ophiodon elongatus*	Kelp greenling[1]	*Hexagrammos decagrammus*
Sablefish	*Anoplopoma fimbria*	Pacific whiting	*Merluccius productus*
Mexican rockfish	*Sebastes macdonaldi*	Redbanded rockfish	*Sebastes babcocki*
Redstripe rockfish	*Sebastes proriger*	Rosethorn rockfish	*Sebastes helvomaculatus*
Sharpchin rockfish	*Sebastes zacentrus*	Silvergrey rockfish	*Sebastes brevispinus*
Longspine thornyhead	*Sebastolobus altivelis*	Tiger rockfish	*Sebastes nigrocinctus*
Halfbanded rockfish[1]	*S. semicinctus*		
HIGHLY MIGRATORY SPECIES			
Swordfish	*Xiphias gladius*	Albacore tuna	*Thunnus alalunga*
Blue shark	*Prionace glauca*	Bigeye tuna	*Thunnus obesus*
Mackeral	*Scomber spp.*	Pomfret	*Brama japonica*
Common thresher shark	*Alopias vulpinus*	Bluefin tuna	*Thunnus thynnus*
Yellowfin tuna	*Thunnus albacares*		

[1] indicates species that are present along Diablo Canyon shoreline vicinity (Tenera, 2011)

IMPACT ASSESSMENT

Project activities that could result in impacts to EFH include seafloor disturbance from cable and OBS placement onto the seafloor and degradation of water quality or seafloor habitats from the discharge of petroleum in the event of an accidental spill. Discussions of the anticipated impacts to the EFH from the proposed activities are provided below.

Placement of OBS Units. The placement of the long-term and temporary OBS units will be completed using a “live boat” method (no anchoring). Placing the OBS units via “live boat” will reduce the potential to disturbance to the seafloor by the placement of anchors and anchor drag. All OBS units will be located on sedimentary seafloor resulting in minor alterations to seafloor features. The long-term OBS units could also potentially enhance habitat by providing a solid substrate on which epibiota could attach.

Once the units are removed, the minor disturbances in the sediment will be returned to natural contours through current and sediment movements. OBS units will not be placed within a NOAA designated HAPC; therefore, there will be no affect to EFH.

Placement of Cable. The cable will be laid onto the seafloor and would not be trenched or buried during installation, but is expected to naturally bury itself into the sedimentary seafloor relatively soon after deployment. The cable will be placed onto some non-sedimentary habitat that includes a low- to moderate relief rocky substrate approximately 0.5 km (0.3 mi) long in water depths of 25 to 27 m (82 to 89 ft) along the inshore segment of the cable corridor.

Other low-relief rock features will be crossed in water depths of 35 to 37 m (107 to 112 ft) and at the 69 m (210 ft) isobath. Within these areas the cable would lie across solid substrates and is not expected to significantly impact the natural composition of the rocky substrate.

Within and adjacent to the DCPP intake embayment, nearshore rocky intertidal habitat that could contain HAPC sensitive kelp beds and rocky features are present (NOAA, 2011; Tenera, 2011). Cable laying operations within the embayment will be preformed by divers; where they will transport the remaining portion of cable from a floating buoy to the terminal end of the conduit. A boulder field and kelp beds are located within the embayment. Divers can assist in the exact placement of the cable to minimize the disturbance to kelp beds and boulder habitat within the embayment. The placement of, and the cable itself, is not expected to impact HAPC; therefore, impacts to EFH will be less than significant.

Hazardous Materials. Petroleum-fueled construction equipment and vessels will be utilized to complete the proposed activities. The potential exists for leakage/spills from those vessels and equipment, and the effects of a petroleum spill to the coastal, water column, and seafloor habitats, which are considered essential to several managed species, and the associated biota could be significant. Oil effects include alteration of habitats by coating the existing substrate or modifying sedimentary habitats; smothering by coating epibiota; and/or affecting the water quality. Refined products tend to be more toxic than crude petroleum, but also evaporate and/or dissipate quicker than heavier crude products. A petroleum discharge from a project vessel could result in potentially significant effects on EFH that is essential to the managed species of interest.

MITIGATION MEASURES

- Implementation of a Project-specific Oil Spill Contingency Plan (OSCP). In addition, the Project-specific OSCP would require equipment and materials to be located onboard Project vessels to provide containment and clean-up should an unanticipated release of hydrocarbons to the marine environment occur.
- A zero-discharge policy would be adopted for all project vessels; no fluids or solids would be discharged into the marine waters shoreward of the mile-limit specified by U.S. and state of California regulations.

- Vessel fueling will only occur at an approved docking facility. No cross-vessel fueling will be allowed. Marine vessels generally will contain petroleum products within tankage that is internal to the hulls of the vessels.
- When in California waters, and as required by OSPR and OPA-90 regulations, an oil spill response and recovery plan would be prepared and maintained and sufficient onboard oil recovery equipment to respond to a specified oil spill would be included. If required, contract arrangements with spill response organizations would be established and maintained.
- Although already incorporated in the Project design to reduce impacts, the "live boat" method would be implemented to reduce impacts to the seafloor.
- Although already incorporated in the Project design to reduce impacts, the cable between the long-term OBS units will not be buried within the sedimentary habitat areas.
- Although incorporated in the Project design to reduce impacts, divers would be used to installed the cable within the seawater intake emabayment area to reduce the disturbance to kelp beds and boulder habitat.

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